Nora Loose

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Research Interests

Physical & computational oceanography, North Atlantic-Arctic connectivity, Ice-ocean interactions, Ocean observing system design, Inverse and adjoint modeling, Uncertainty quantification

Education

08/2019 **University of Bergen**, Bergen, Norway.
Ph.D. in **Physical Oceanography**
○ Thesis: *Adjoint Modeling and Observing System Design in the Subpolar North Atlantic*
○ Advisors: Kerim H. Nisancioglu (University of Bergen), Patrick Heimbach (UT Austin)
○ Funded by European Research Council project ice2ice

02/2013 **University of Bonn**, Bonn, Germany.
Diploma (equiv. M.Sc. degree) in **Mathematics**, **with Honors**
○ Specialization: Stochastic Analysis; Minor: Physics

Professional Appointments

10/2018 - **Research Fellow**, *Oden Institute for Computational Engineering and Sciences*, University
present of Texas at Austin, USA.
○ Mentor: Patrick Heimbach
○ Investigate dynamical teleconnections in the North Atlantic and Arctic Ocean
○ Develop quantitative and dynamics-based methods for ocean observing system design

03/2013 - **Research Fellow**, *Department of Mathematics*, ETH Zurich, Switzerland.
08/2014 ○ Conducted research in the fields of Geometric Analysis and Partial Differential Equations
○ Taught courses for graduate and undergraduate students

Teaching and Outreach

February **Volunteer**, *Girl Day STEM Festival*, UT Austin.
2020 ○ hands-on science activities and demonstrations for elementary and middle school students

03/2013 - **Teaching Assistant**, *Department of Mathematics*, ETH Zurich, Switzerland.
08/2014 ○ Taught 3 math courses (*Measure Theory and Integrals, Differential Geometry I & II*) for graduate and undergraduate students
○ *Teaching evaluations*: 4.8 (2013), 4.9 (2014) on a scale from 1 (very bad) to 5 (excellent)

07/2013 **Teaching Assistant**, *PCMI Graduate Summer School*, Park City, USA.
○ Taught advanced math course (*Weak immersions of surfaces with L^2-bounded second fundamental form*) for Ph.D. students and postdocs

10/2008 - **Teaching Assistant**, *Department of Mathematics*, University of Bonn, Germany.
02/2013 ○ Taught 3 math courses (*Mathematics for Physicists I, Analysis II & III*) for undergraduate students

01/2010 - **Teaching Assistant**, *Department of Mathematics*, University of Toronto, Canada.
04/2010 ○ Taught math course (*Linear Algebra*) for undergraduate students

2009 - 2011 **Organizer of outreach events**, *Hausdorff Center for Mathematics*, University of Bonn, Germany.
○ Organized and led math outreach events for students from elementary and secondary school
○ Ran bi-weekly club to foster students' talent for mathematics

Professional Service

Organization of Conferences

04/2017 Co-Convener for the session "Quaternary climate archives and proxy uncertainty", EGU General Assembly 2017.

09/2015 Co-Organizer of PhD conference "Connecting the ocean, atmosphere and ice sheets", 20 participants, Denmark.

Awards and Scholarships

04/2019 **Rising Stars in Computational & Data Sciences**, *Oden Institute for Computational Engineering and Sciences*, University of Texas at Austin, USA.
- Selected to attend the competitive and international career event "Rising Stars in Computational & Data Sciences" for women (acceptance rate: 21%)

03/2018 **Best Presentation Award**, *Research School on Changing Climates in the Coupled Earth System*, Sommarøy, Norway.

02/2016 **Research Grant**, *Norwegian Research School in Climate Dynamics*, NOK 20,000, for research stay at MIT.

2013 - 2016 **Scholarships for various summer schools**.
- IARC Summer School 2016, *International Arctic Research Center, University of Fairbanks*: $2,500 + accommodation
- ACDC Summer School 2015, *Norwegian Research School in Climate Dynamics*: Travel, accommodation, meals
- New Directions Short Course IMA 2015, *Institute for Mathematics and its Applications, University of Minnesota*: Travel, accommodation, meals
- PCMI Summer School 2013, *Institute for Advanced Study, Princeton*: Travel, accommodation, meals

2009/10 **Scholarship for Study Abroad Program at the University of Toronto**, *University of Bonn*, Travel and tuition fees.

2008 - 2012 **German Academic Scholarship Foundation Award**, *Studienstiftung des deutschen Volkes*, for outstanding academic achievements (given to 0.5% of German university students).

2006 **Ferry Porsche Award**, *Porsche AG*, for excellent performance in mathematics and physics.

2006 **Award German Physical Society**, *German Physical Society*, for excellent performance in physics.

2006 **Award Reinhold Beitlich Foundation**, *Reinhold Beitlich Foundation*, for exceptional results in the Abitur (equiv. high-school diploma).

Publications

2019 Y. Fujii, E. Rémy, H. Zuo, P. Oke, G. Halliwell, F. Gasparin, M. Benkiran, **N. Loose**, J. Cummings, J. Xie, Y. Xue, S. Masuda, G.C. Smith, M. Balmaseda, C. Germineaud, D.J. Lea, G. Larnicol, L. Bertino, A. Bonaduce, P. Brasseur, C. Donlon, P. Heimbach, Y. Kim, V. Kourafalou, P-Y. Le Traon, M. Martin, S. Paturi, B. Tranchant and N. Usui. Observing System Evaluation Based on Ocean Data Assimilation and Prediction Systems: On-Going Challenges and a Future Vision for Designing and Supporting Ocean Observational Networks, *Front. Mar. Sci. 6:417*. doi: 10.3389/fmars.2019.00417.

2019	**N. Loose**. Adjoint Modeling and Observing System Design in the Subpolar North Atlantic, *Ph.D. Dissertation*, University of Bergen.
submitted	**N. Loose**, P. Heimbach and H. Pillar. Quantifying Dynamical Proxy Potential through Oceanic Teleconnections in the North Atlantic.
in prep.	**N. Loose** and P. Heimbach. Uncertainty Quantification in Ocean State Estimation as a Tool for Observing System Design.
in prep.	**N. Loose**, P. Heimbach, H. Pillar and K.H. Nisancioglu. The Dynamical Proxy Potential of the OSNAP Array.
in prep.	**N. Loose**, H. Pillar, M. Årthun, K.H. Nisancioglu and P. Heimbach. Remote Drivers of Nordic Seas Heat Content Anomalies and Climate Predictability.
in prep.	**N. Loose** and P. Heimbach. Dynamics-based Observing System Design via Adjoints with Application to the Arctic Ocean.

Presentations

Invited Talks

02/2020	**Ocean Sciences Meeting 2020**, *San Diego, USA*, N. Loose, P. Heimbach, H. Pillar and K.H. Nisancioglu: The Dynamical Proxy Potential of the OSNAP Array.
04/2018	**EGU General Assembly 2018 (solicited)**, *Vienna, Austria*, N. Loose, P. Heimbach, K.H. Nisancioglu: How informative are SST proxy data in paleoceanographic inverse modeling? - Insights from comprehensive uncertainty quantification.
03/2018	**University of Edinburgh**, *Edinburgh, UK*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification and Constraints on Subsurface Heat Content at Greenland's Margins.
03/2018	**Northumbria University**, *Newcastle, UK*, N. Loose, P. Heimbach, K.H. Nisancioglu: Uncertainty Quantification and Constraints on Subsurface Heat Content at Greenland's Margins.

Conference Presentations

10/2018	**ECCO Meeting**, *Austin, USA*, N. Loose and P. Heimbach: Comprehensive Observing System Design within the ECCO Framework.
07/2018	**Workshop on Sensitivity Analysis and Data Assimilation in Meteorology and Oceanography**, *Aveiro, Portugal*, N. Loose and P. Heimbach: Uncertainty Quantification as a Tool for Observing System Design - An Oceanographic Perspective.
06/2018	**TACOMA Workshop**, *Oxford, UK*, N. Loose and P. Heimbach: Adjoints as a Tool for Observing System Design.
03/2018	**CHESS Meeting**, *Sommarøy, Norway*, N. Loose, P. Heimbach and K.H. Nisancioglu: Uncertainty Quantification and Observational Constraints in Paleoceanographic Inverse Modeling.

Posters

06/2017	**Data Assimilation Workshop**, *Bergen, Norway*, N. Loose, P. Heimbach, K.H. Nisancioglu: How Informative are Paleoceanographic Observations for an Inverse Problem?.
05/2017	**PAGES Workshop**, *Louvain-la-Neuve, Belgium*, N. Loose, P. Heimbach and K.H. Nisancioglu: How Informative are Paleoceanographic Observations for an Inverse Problem?.
04/2017	**EGU General Assembly 2017**, *Vienna, Austria*, N. Loose, P. Heimbach and K.H. Nisancioglu: Uncertainty Quantification for Non-Linear Inverse Problems with Sparse Data.

03/2017 **Workshop on Emerging Applications of Data Assimilation in the Geosciences**, *Leiden, Netherlands*, N. Loose, P. Heimbach and K.H. Nisancioglu: Uncertainty Quantification for Adjoint-Based Data Assimilation with Sparse Data.

12/2016 **AGU Fall Meeting 2016**, *San Francisco, USA*, N. Loose, P. Heimbach and K.H. Nisancioglu: Can Paleo Ocean Proxy Data Constrain General Circulation Models Using an Inverse Method?.

Field Work

07/2017 - **East Greenland Ice-Core Project (EastGRIP)**, *Greenland*.
08/2017   ○ Drilled shallow ice cores, conducted surface measurements and lab work in the science trench

08/2016 - **G.O. Sars**, *Irminger Sea*.
09/2016   ○ Collected physical oceanographic data and marine sediment cores for the Ice2Ice project (ERC)

Skills

Programming

  ○ Python, MATLAB, MITgcm, Fortran, C++, Unix/Linux operating systems, shell scripting, NetCDF, LaTeX.

Languages

  ○ *Fluent in:* German, English, Norwegian; *Basic knowledge in:* Spanish, Italian.